

AEES QUARTERLY

The Official Newsletter of the American Ecological Engineering Society

Sharing our stories, building networks, and growing together.



President's Notes

By Michael Burchell, PhD
AEES President



“Just think of how much we could learn from one another and the collaborations we could build if we engaged regularly during the entire year?”

Greetings!

We come to you after very successful 2021 AEES Virtual Meeting, hosted by The Ohio State University. Special thanks to Dr. Jay Martin, Sam Francis, and OSU Extension for putting forth such a fine event. It was great to see old friends and colleagues and meet some new ones, and see the outstanding work that is ongoing to tackle real-world environmental challenges and advance the field of Ecological Engineering. We can't wait to see everyone in person during our next annual meeting in Baltimore, MD June 20-23, 2022! Conference planning has already begun – details coming soon.

Our annual meeting is always accompanied by a changing of the guard of AEES leadership. This year we bid farewell to Dr. Andrea Ludwig (University of Tennessee), Dr. David Blersch (Auburn University), Dr. Ani Jayakaran (Washington State University), and Sam Francis who rotated off the Executive Committee as President, Secretary, Past-President and Student Representative respectively. Thank you all for the many hours you dedicated to AEES in these roles - the society is clearly stronger because of your service!

Dr. Stephanie Lansing (University of Maryland) was elected Vice-President and President-Elect, Dr. Tiffany Messer (University of Kentucky) was elected Secretary, and Dr. Eban Bean (University of Florida) will remain as Treasurer. Our graduate student representative to the committee will be Ana Gabriela Itokazu (Auburn University). Dr. Andrea Ludwig will remain on the committee as Past-President. Of note, a recent change

in our by-laws now call for 2-year alternating terms for the Secretary and Treasurer positions to allow for more continuity.

While engaging with everyone at the meeting is fun, it's only a once a year event. Just think of how much we could learn from one another and the collaborations we could build if we engaged regularly during the entire year? We hope that this newsletter will help remind you of the many opportunities for us to advance our discipline and strengthen our society. So be on the lookout for requests to serve on committees, contribute to the newsletter, participate in upcoming webinars, and contribute to membership drives.

Working together, we can strengthen this society and further build upon its foundation to make meaningful impacts in the development of sustainable ecosystems that integrate human society with its natural environment - **for the benefit of both!**

Society News

To make your own submission for News or Highlights, [please submit here](#).

New Executive Committee for 2021-2022 Set!

President—Michael Burchell, Professor, NC State University

Vice-President and President Elect—Stephanie Lansing, Professor, University of Maryland

Secretary—Tiffany Messer, Assistant Professor, University of Kentucky

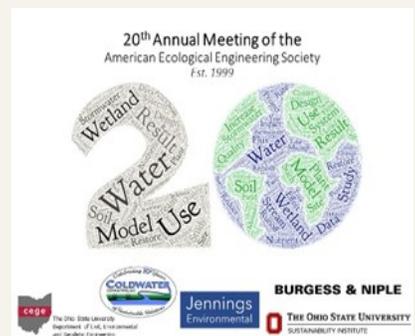
Treasurer—Eban Bean, Assistant Professor, University of Florida

Student Representative—Ana Gabriela Itokazu, Auburn University

Past-President—Andrea Ludwig, University of Tennessee

Annual Meeting Highlights

This year, our society did something we all hope we never have to do again....pulled off a successful virtual conference. It can indeed be called a big success under the circumstances because we gathered together to share our work all while generating income for the society. Thanks to the thorough planning and hosting duties from our colleagues at The Ohio State University along with our conference sponsors, we were able to accomplish many achievements during the 20th Annual [Virtual] Meeting:



- Fifty-eight oral presentations in eleven technical sessions, spanning a wide range of topics.
- Twenty-nine student posters at the Second Annual Virtual Student Poster Symposium and Competition. Check out the poster winners featured in this newsletter and all the poster presentations still accessible at <https://aeseposters.org/>
- Dr. Alex J. Horne was the recipient of the third Odum Award for Ecological Engineering Excellence.
- Officer elections were held, and Drs. Stephanie Lansing and Tiffany Messer were elected to the Executive Committee as we thanked Drs. Ani Jayakaran and David Blersch as well as Sam Francis for their service as they rolled off.
- Big steps were taken towards realizing a goal that stemmed out of the 2020 virtual Business Meeting, the creation of the Journal of Ecological Engineering Design (JEED).

Thank you to the conference host team of Dr. Jay Martin, Sam Francis, and Dr. Gil Bohrer as well as the 2020-2021 Executive Committee. Thank you to all the sponsors, presenters and attendees for making conference a quality event. We look forward to seeing everyone in person in 2022!

Journal of Ecological Engineering Design

An ad hoc taskforce has been diligently working towards providing our society an opportunity to forge new ground in open access publication while giving our members an additional platform to publish their work in ecological engineering design. This taskforce has received the go-ahead from membership and the Executive Committee. A journal taskforce has been formed, and members of the taskforce are currently evaluating nominees for Editor in Chief and Associate Editors. Contact Dr. Eric Roy (Eric.Roy.1@uvm.edu) with questions or suggestions.

Committee Updates

Joining a AEES committee at any time of the year is strongly encouraged. Please contact the Committee Chair if you are interested.

Conference Planning Committee

Chair of Committee – Stephanie Lansing slansing@umd.edu

The AEES Conference Committee works with the organizing conference hosts to create innovative and inclusive programming for upcoming conferences, helps to streamline meeting planning from one year to the next, and assists with the logistics of conference planning in regards to programming, keynote speakers, awards, student engagement, field trips, and bringing new ideas to the program.

Diversity, Inclusion, Equity, and Justice (DIEJ) Committee

Chair of Committee – Ani Jayakaran anand.jayakaran@wsu.edu

Our purpose is to guide and coordinate the activities of AEES in matters relating to the promotion of diversity, equity, inclusion, and justice in the practice and education of ecological engineering. The committee will work on initiatives that give AEES members tools to make both this technical society, and the wider communities we work with, more equitable, diverse, and inclusive, through justice-based actions.

Recruitment Committee

Chair of Committee – Michael Burchell mike_burchell@ncsu.edu

The AEES Recruitment and Membership committee strives to strengthen the society and our discipline by steadily increasing both our membership numbers and diversity, and developing ways to provide the most economical and beneficial experience for our membership.

Student Chapter Committee

Chair of Committee – Ana Gabriela Itokazu gabi@auburn.edu

The AEES Student Committee supports AEES Student Chapters, providing resources and engagement for their development. For the upcoming year, the Committee will design a document to assist institutions in creating and organizing new AEES Student Chapters. The Committee is also working on an online discussion board where students can share opportunities and highlight their research.

Body of Knowledge Committee

Chair of Committee – Tricia Moore tlcmoore@ksu.edu

In line with its charge to identify core areas of knowledge underpinning the practice of ecological engineering, the committee has continued to pursue development of ABET criteria for undergraduate ecological engineering programs as its primary, short-term goal. As a longer-term goal, the committee seeks to define knowledge areas to support delineation of clear pathways to ecological engineering outside of an undergraduate engineering degree.

Meet Our Student Poster Winners

Jonae` R. E. Wood

Institution: North Carolina A&T State University

Degree: M.S. in Agriculture and Environmental Science with a concentration in Natural Resources and Environmental Design

Advisor: Dr. Niroj Aryal

Research poster summary: My research project is entitled Plant and Rhizosphere Processes that Prevent Groundwater Contamination from Metals and Nitrates. This is being studied using two complementary experiments. The first one is a small column experiments being conducted for the period of ~30 days where a mixture of sand and soil is spiked with As, Mn and Fe to mimic their environmental concentrations. The second

experiment is a large column experiment being conducted for ~365 days using just soil. In both experiments there are six (6) columns; 3 with tall shade poplars (*Populus deltoides* x *Populus nigra*) and 3 no plant controls all fitted with a probe to monitor soil oxygen, ORP and soil moisture. Synthetic food processing wastewater is applied to each column every other day and then the leachate is collected and analyzed weekly. Analytical parameters being measured include: TN, N-NO₃, N-NH₃, COD, metals, microbial analysis, pH, and TOC. The goal is to understand plant-soil-microbe processes to assist in phytoremediation design.

The most exciting/surprising part: The most exciting part of my project so far has ironically also been the most challenging part as well. It is regrouping after every failed attempt to get my plants to establish. This is because as scientists we have a thirst for knowledge and after each failed attempt, I'm able to learn something new about my research whether it's about the poplars, the soil environment or the symbiotic relationship between the plant and the soil. As an individual who is driven by curiosity this satisfies me deeply.

Connections to Ecological Engineering: The ecological component on this study is the interrelationship between soil, plants and microorganisms. The challenge of protecting our groundwater sources has been an issue for a while. My research is extremely relevant because it introduces a new voice/viewpoint on "green" ways to protect our groundwater while also saving the earth from climate change using phytoremediation.

Fun fact about Jonae`: I'm from the Bahamas.



Layla El-Khoury

Institution: North Carolina State University

Degree: M.S. in Biological Engineering with a Water Resources Minor (Department of Biological and Agricultural Engineering)

Advisor: Dr. Barbara Doll

Research poster summary: Streambank erosion can be the most significant source of in-stream sediment loads contributing 17-92% of the total load. When restoring streams, conservation, state and federal organizations need to identify the sites in greatest need of restoration often requiring surveys and assessments of hundreds of miles of streams. My research focuses on desktop geospatial tools and rapid field assessments to identify and prioritize problem areas.

One of the geospatial tools is the USGS's Positive Openness layer that identifies incised and eroding streams from relief angles calculated from DEMs. The goal is to validate the accuracy of the Positive Openness layer at identifying incised and eroding streams. Currently the layer needs further refinement reduce the number of false positive and negatives found.

The Bank Erosion Hazard Index (BEHI) is commonly used tool to quickly assess bank erosion potential using visual and quantitative metrics. The objectives are to identify when BEHI combined with estimates of near bank stress can accurately predict erosion rates and compare various methods to measure erosion rates: cross-section surveys, aerial imagery analysis and LiDAR surveys. The ultimate goal is to produce erosion curves for Virginia using the BANCS method and examine the inclusion of additional variables to improve predictions.

Most exciting/surprising part: I've really enjoyed going to the field to collect data. Our travels to the study sites in Virginia often require gorgeous scenic drives through the mountains. One site in a pasture had cattle who were not fenced away from the stream, and the bull was not thrilled we were there. On a good and surprising note, the correlation (0.54) between the measured bank retreat and BEHI and NBS from the first few sites is higher than I anticipated.

Connections to Ecological Engineering: The application of geospatial techniques for stream stability and change analysis opens the possibility for examining channel processes on larger spatial and temporal scales to gain a better understanding of the episodic nature of streams. Introducing more geospatial tools will reduce the amount of time and work required in the field to help maximize the limited resources for restoration projects.

Fun fact about Layla: I have been dancing since I was 3. This fall semester I am doing an independent dance study class at NCSU where I will choreograph a dance piece about my research.



Lane Maguire

Institution: Washington State University

Degree: M.S. Environmental Science (Puyallup Research and Extension Center, School of the Environment)

Advisor: Dr. Jenifer McIntyre



Research poster summary: The current study aims to determine the effectiveness and longevity of bioretention soil media (BSM) at various infiltration depths, including those shallower than the depth currently required by the Washington Department of Ecology (18"). Experimental columns, containing five different BSM depths, were dosed with roadway runoff at an accelerated rate in order to simulate six water years in approximately 15 calendar months. The chemical and biological effectiveness of the columns in treating runoff was assessed using analytical chemistry and the health of juvenile coho salmon. Bioretention treatment efficiently removed copper, zinc, total PAHs, and total suspended solids (> 70% removal). Although all treatments continued to export nitrates after six accelerated years, the export of nutrients was greatly reduced by the end of the first accelerated year. Influent stormwater runoff was acutely lethal to juvenile coho salmon (88, 90, and 100% mortality in three exposures across the six accelerated years). However, treated effluent stormwater completely prevented coho mortality for all bioretention depths and for all three exposures, indicating a continued ability to prevent acute lethal toxicity after six accelerated years of treatment. This study is ongoing and will continue to assess bioretention effectiveness through 10 accelerated years.

Most exciting/surprising part: I think that it is exciting to see that a simple soil media mixture of compost and sand can improve roadway runoff quality and reduce toxicity to aquatic organisms. The results of my graduate research suggest that we can see these same improvements with a shallower depth of media than what is currently required in WA state, which would decrease costs and increase the accessibility of this technology.

Connections to Ecological Engineering: The many impervious surfaces that accompany urbanized environments greatly reduce the infiltration of rainfall. Instead, a majority of rainfall runs untreated into surface waters, along the way collecting a concoction of contaminants. Bioretention systems help address threats to receiving waters by mimicking the ability of undeveloped landscapes to capture and filter runoff. In this way, bioretention integrates human society with its natural environment for the benefit of both.

Fun fact about Lane: I was a member of the cross country and track teams at the University of Oklahoma. I think that balancing academics and athletics as an undergraduate helped prepare me for graduate school.



Joe Barrett Carter III

Institution: University of Florida

Degree: Ph.D. (Department of Agricultural and Biological Engineering)

Advisors: Dr. Eban Bean and Dr. Aditya Singh

Research poster summary: My poster outlines some of the research I am doing related to the development of an open-source UV-Visible spectroscopy setup to be used for

high-frequency water quality analysis, which has the potential to help alleviate some water quality issues by reducing the number of resources required to perform water quality analysis. The objective of the study was to determine the accuracy and precision of nutrient concentration estimates made using UV-Vis spectroscopy and partial least squares (PLS) regression in multiple watersheds with varying degrees of urbanization. To do this, samples were collected from seven watersheds in and around Gainesville, FL, and they were analyzed for nutrient concentrations (nitrate and phosphate) using standard laboratory procedures. UV-Vis spectra of the samples were also collected using a custom-made benchtop setup. The relationship between the lab-measured concentrations and the spectra was then modeled using PLS. Results show that both nitrate and phosphate concentrations can be estimated fairly accurately with r^2 values of 0.935 and 0.761, respectively. In the future, this system could be used to estimate nutrient concentrations within ecosystems at higher-than-normal rates to better understand and control the processes taking place at small temporal scales.

Most exciting/surprising part of my research: It was really exciting to see that the system I built from scratch using a Raspberry Pi and a Python script was able to estimate nutrient concentrations at levels similar to previous studies which used expensive off-the-shelf equipment.

Connections to Ecological Engineering: Ecosystem health and function is largely dependent on internal nutrient concentrations. This technology has the potential to improve the science and practice of ecological engineering by allowing us to collect water quality information more rapidly and to take part in the decision-making process for ecologically engineered systems.

Fun fact about Barrett: I enjoy being out in nature and foraging for food, especially wild mushrooms. I like to imagine a world where our grocery stores look more like forests rather than warehouses.



Some members of the Lactifluus genus (a.k.a. "milk-caps") that I found in the summer of 2020.

21st Annual AEES Meeting

Planning is Underway

The next AEES Annual Meeting will be held in Baltimore MD, June 20-23, 2022. Conference organizers led by Vice-President Dr. Stephanie Lansing and Dr. Peter May, both with the University of Maryland, are working diligently to finalize the venue for the event. Stay tuned for what promises to be an exciting meeting!

DEPARTMENT OF ENVIRONMENTAL SCIENCE & TECHNOLOGY

AEES 2022 in Baltimore MD
June 20 - 23, 2022
Hosted by the University of Maryland

Highlights for AEES Baltimore 2022:
Environmental Justice and Urban Revitalization
Chesapeake Bay TMDLs, Stream and Wetland Restoration
Food Water Energy Nexus and Urban Agriculture
Green Infrastructure and Stormwater Management
Ecotechnology Innovations, Renewable Energy, Urban Heat Island

Get Featured in the Next Edition

We are always looking for new stories to tell, highlighting ecological engineering in academic, industries, locally and abroad. If you have a project you would like highlighted, know someone we should interview, or have pictures of groundbreaking research, please send them to our website manager, Brittany Santore (brittany_santore@ncsu.edu) to be featured in our next edition of the AEES Quarterly.

Career Opportunities

Research/Lab Technician

University of Vermont

Posted 08-22-2021

PhD Graduate Student Assistantship

Clemson University

Posted 08-22-2021

PhD Graduate Student Assistantship

Central Michigan University

Posted 08-22-2021

MS Graduate Student Assistantship

Central Michigan University

Posted 08-22-2021

PhD Graduate Student Assistantship Available in Municipal Solid Waste Characterization

University of Maryland

Posted 08-13-2021

Research Associate (Postdoctoral Researcher)

Michigan State University

Posted 07-22-2021

Ecological Engineer

MAD Scientist Associates

Posted 05-04-2021

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<https://www.ecoeng.org/job-postings>